Concept No 1

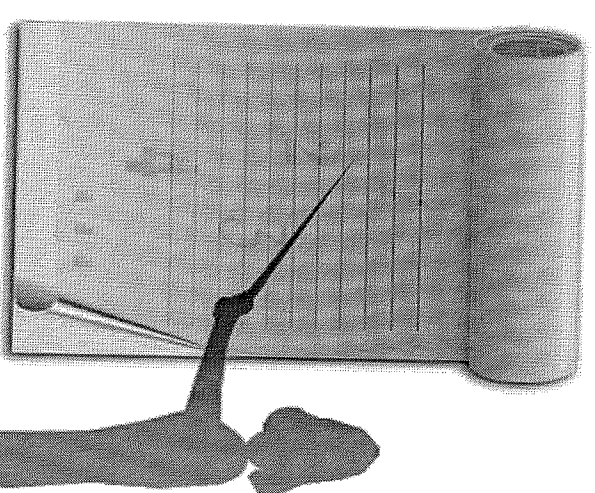# Cross Network Service Solutions

Shai Stein
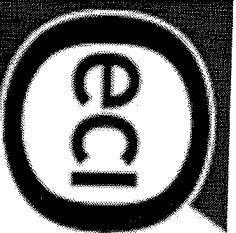
CTO, BB Access Division

Exhibit A

Agenda

- **NGN Services and Architecture**
- **HiFOCuS MSAG Solution**
- **Web Based Service Category**
- **Conversational Service Category**
- **Voice at the Access**
- **Video Solution**
- **Mobility and Personalization**
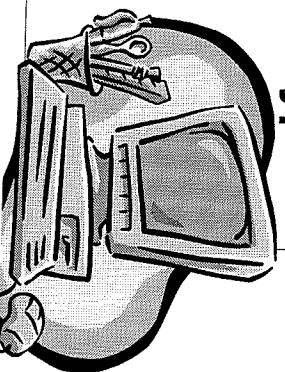- **Cross Network Subscribers**

NGN Service Evolution

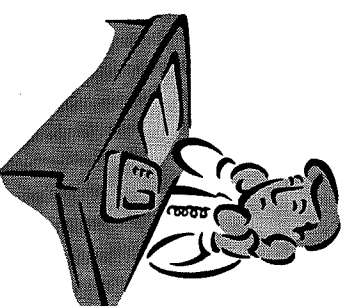## Service Categories per Wireline Network Infrastructure

Web based:

- **Fast Internet and e-mail, graded per customer type and on-demand**
- **E-Commerce**
- **Content services**

Conversational services:

Peer-to-peer Multimedia or voice-only

- **Telephony over BB**
- **Video Telephony**
- **PC to PC multimedia**
  - IM and Presence
  - Image transfer
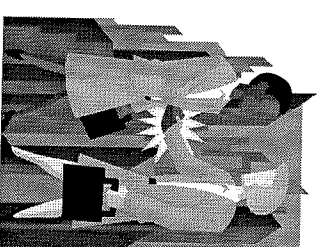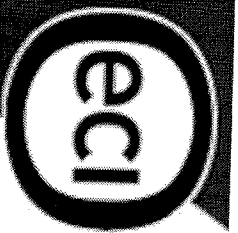 - Collaboration

Entertainment:

- **Video/Music Broadcasting:**
  - Flat rate or PPV
- **Video/Music on Demand**
- **Interactive TV**
- **Gaming**
  - Multi-players
  - With voice

Mobility & Personalization

Business:

- **Tele-working**
- **Video Conferencing**
- **IP Centrex**
- **VPN:**
  - Telephony, Data, multimedia
- **Central storage: Backup&mirroring**
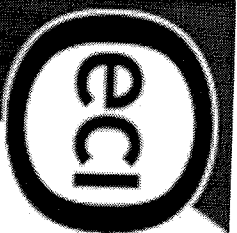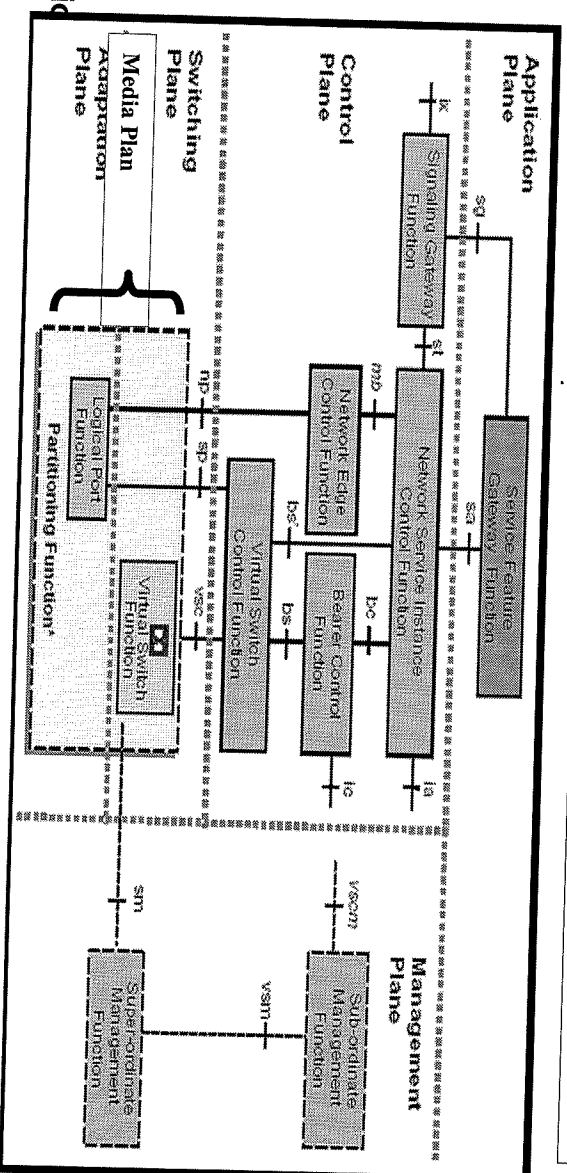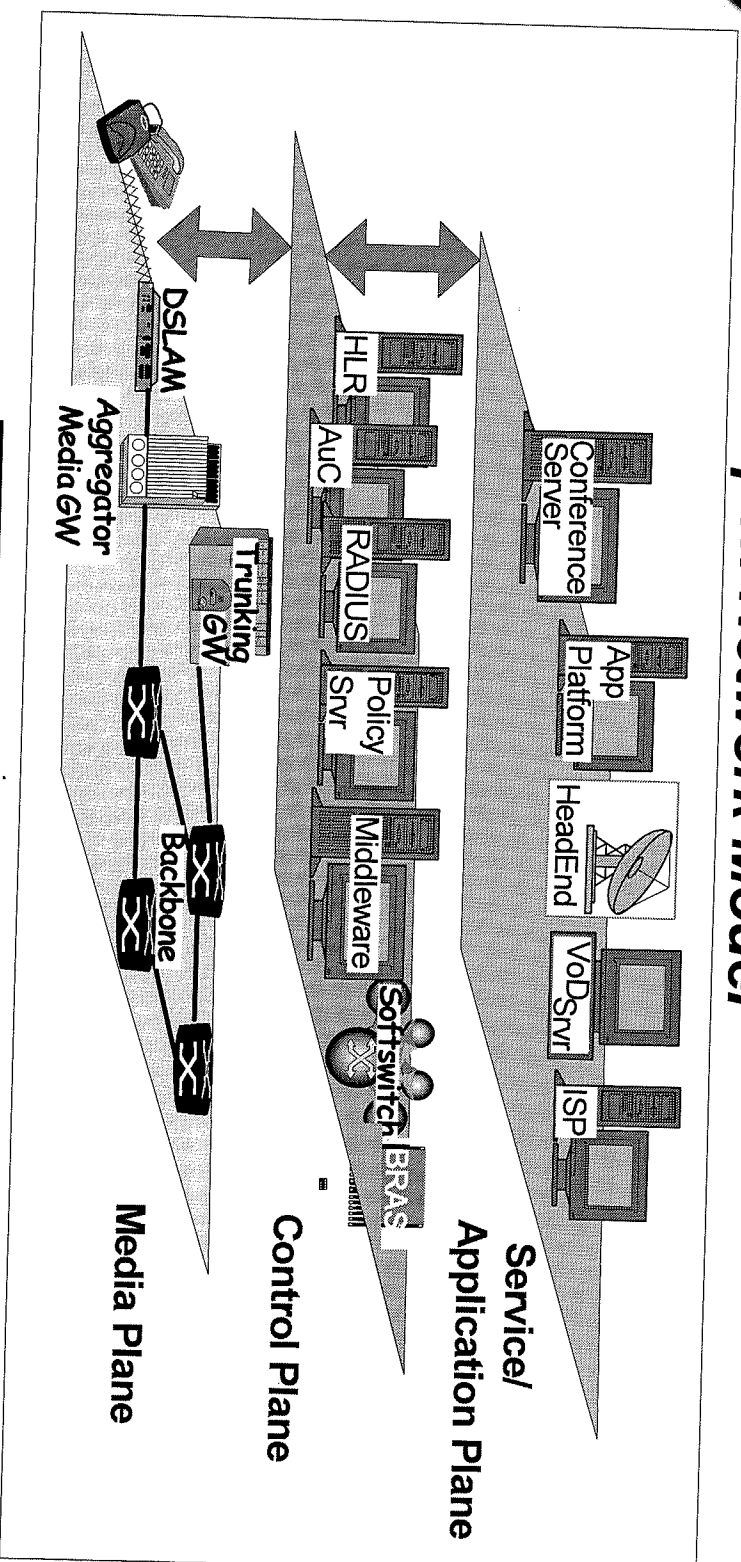- **E1/T1 Backhauling (TDM&ATM)**

Cross Network Services

3G Mobile Network and Wireline Fixed Network

- **Common mobile terminal for both networks:**
  - ◆ Wireless Technology is the enabler:
    - ▪ DECT / Bluetooth / Wi-Fi / WCDMA
    - ▪ Dual interface mobile terminal (e.g. WCDMA and DECT)
  - ◆ Roaming between mobile network and fixed network
  - ◆ Optional session handoff between the networks

- **Added-value services to nomadic/fixed subscribers:**
  - ◆ Roaming and reduced handoff capabilities
  - ◆ Location services (@Home / @Office / @Hot-spot-x)
  - ◆ SMS→ EMS → MMS services
  - ◆ 3G-324M video service
  - ◆ Visited network emergency services

- **Conversational multimedia services between wireline and mobile subscribers:**
  - ◆ Related Media and Signaling conversions
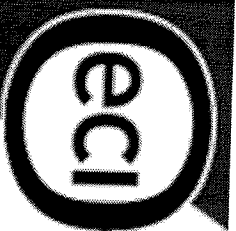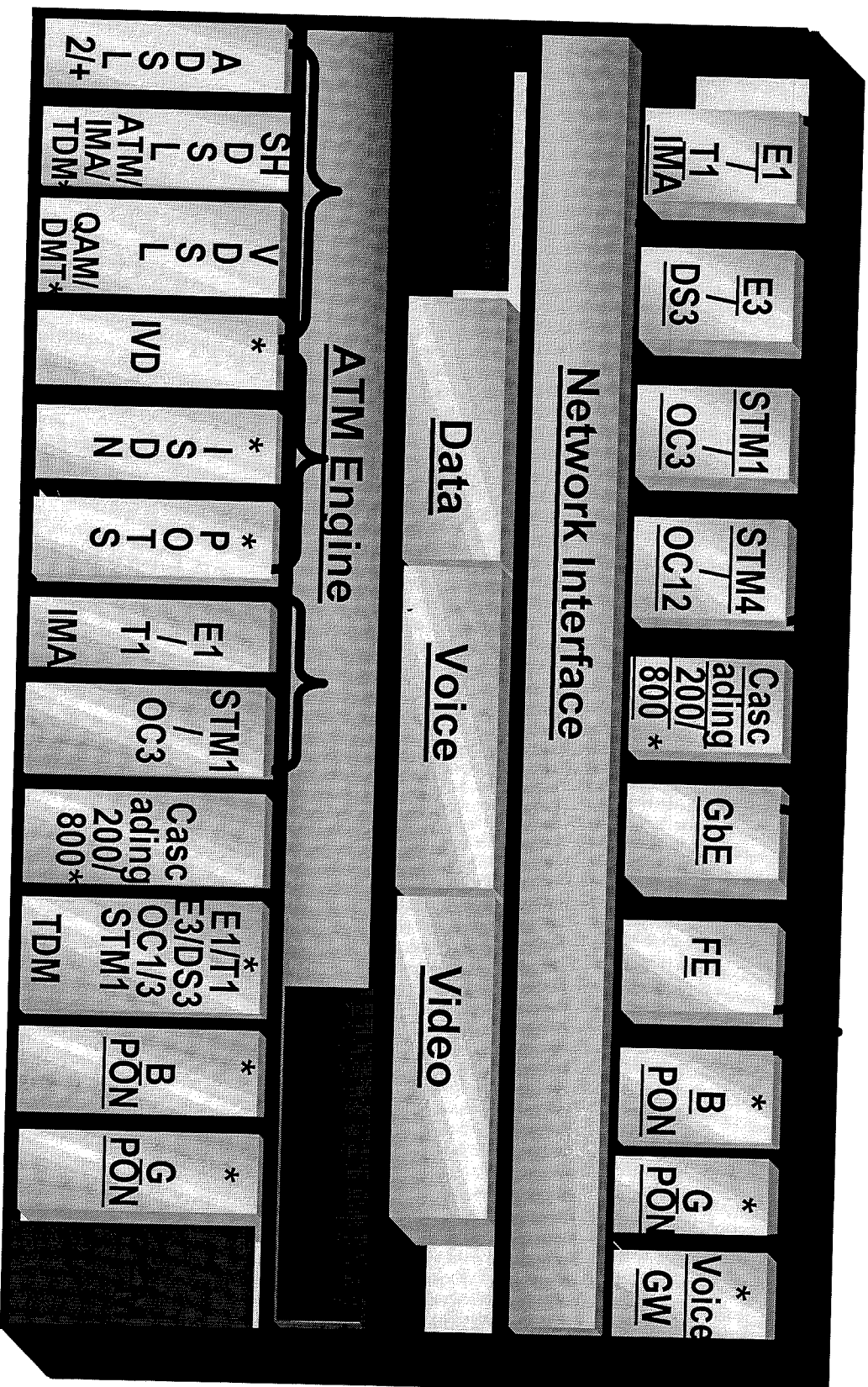
NGN Network Architecture

Open Network Model

eci

Service/
Application Plane

Control Plane

Media Plane

Conference Server
App Platform
HeadEnd
VoDSrvr
ISP

HLR
AuC
RADIUS
Policy Srvr
Middleware
Softswitch
BRAS

DSLAM
Aggregator Media GW
Trunking GW
Backbone

Application Plane
Signaling Gateway Function
Service Feature Gateway Function

Control Plane
Network Service Instance Control Function
Network Edge Control Function
Bearer Control Function

Switching Plane
Virtual Switch Control Function

Media Plan
Adaptation Plane
Logical Port Function
Virtual Switch Function
Partitioning Function*

Management Plane
Super-ordinate Management Function
Sub-ordinate Management Function

ix
sq
st
 sa
mb
np
sp
bs'
vsc
bs
bc
bo
tc
ia
sm
vscm
vsm

ntial

HiFOCuS MSAG Solution

Multi-service Access Gateway

Hi-FOCuS™ MSAG Platform

ecı

Network Interface

Data | Voice | Video

Network Interface inputs:
- E1 / T1 IMA
- E3 / DS3
- STM1 / OC3
- STM4 / OC12
- Cascading 200/800 *
- GbE
- FE
- B PON *
- G PON *
- Voice GW *

ATM Engine

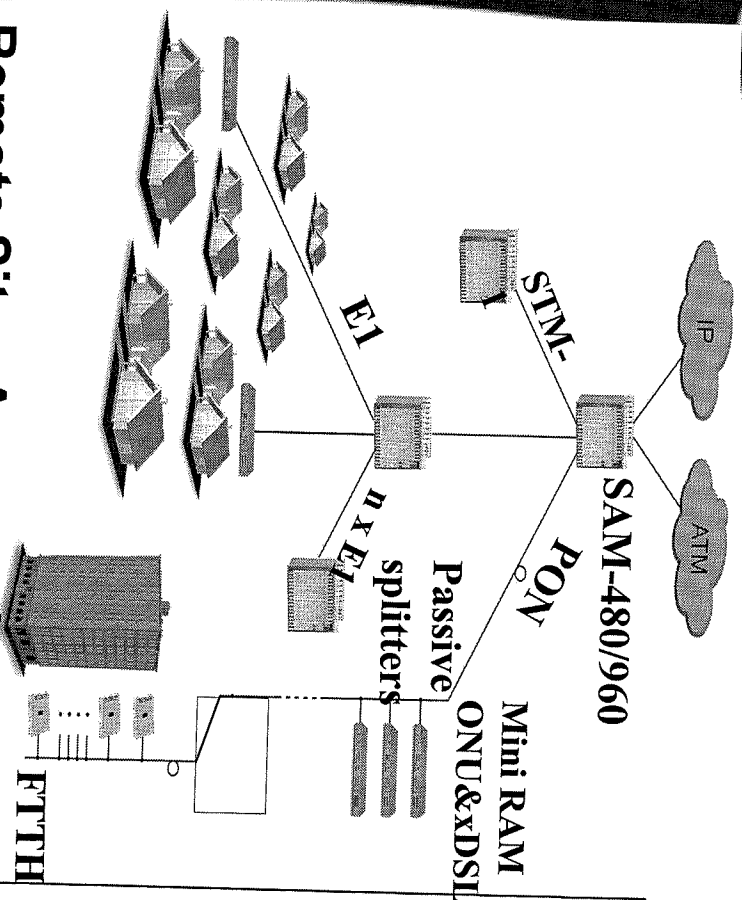| SH | V | * | * | * | E1 / T1 | STM1 / OC3 | Casc ading 200/ 800 * | E1/T1 E3/DS3 OC1/3 STM1 TDM * | B PON * | G PON * |
D	I	S	P
S	D	S	O	O
L	N	T	T
IVD	IMA			

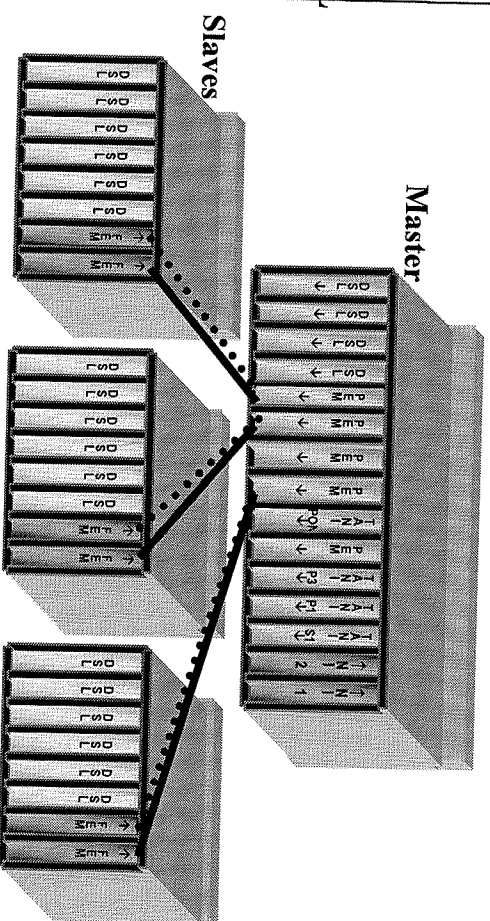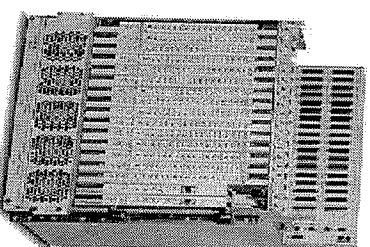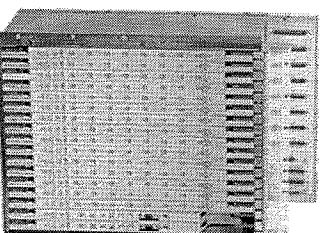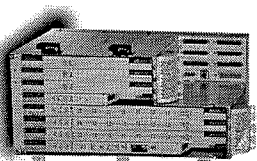| A | SH |
D	D
S	S
L	L
2/+	ATM/ IMA/ TDM*	QAM/ DMT*

(*): In Progress (*): Planned
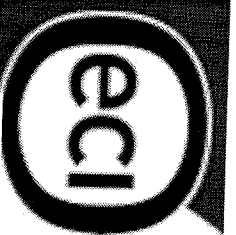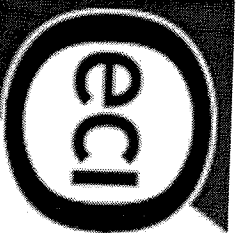
Access Network Topologies
Any Topology and Site

Remote Sites Aggregation:
Any size, Any technology, Any BW,
Any Environment, Any Backbone, Any
Service, Remote Powering & Repeaters

IP

ATM

STM-1

SAM-480/960

PON

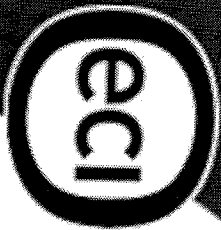Mini RAM
ONU&xDSL

E1

n x E1

Passive
splitters

FTTH

Mini-Splitters

MiniRAM

FlexRAM

SAM480

SAM960

High Scalability/Density @ CO Sites

Slaves

Master

Outside Plant Solutions
Outdoor and Indoor Cabinets

Web Based Service Category
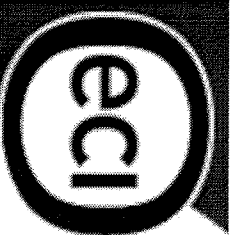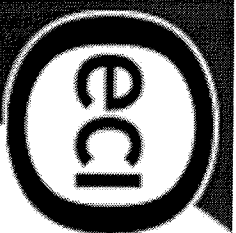
Current Web Based Service

- **Current Service:**
  - ◆ Best effort with non-guaranteed QoS
  - ◆ Centralized BRAS platforms:
    - ■ PPP access method
- **Missing features:**
  - ◆ Scalable model:
    - ■ Higher penetration and higher usage
      - ○ Attractive services
  - ◆ Turbo button for QoS on-demand:
    - ■ High capacity BRAS vs. distributed BASes
    - ■ Need for agreed implementation concept
    - ■ Modify the link all the way from CPE to ISP
  - ◆ Improved authentication:
    - ■ Over metro Ethernet and mobile environment (e.g. Wi-Fi)
  - ◆ Co-exist with non-web-based services
    - ■ DHCP with virtual routing vs. PPP method

Metro#1

BRAS

Layer 2 link

DSLAM #1

DSLAM Agg

DSLAM #n

CPE

Metro Network

L2tp

L2 Switch

Core Network

ISP#n

Layer 2 link

DSLAM #1

DSLAM Agg

DSLAM #m

CPE

ISP#1

Hi-FOCuS Planned Evolution

- **Current Service:**
  - ◆ Best effort with non-guaranteed QoS
  - ◆ Centralized BRAS platforms:
    - ■ PPP access method

- **Missing features:**
  - ◆ Scalable model:
    - ■ Higher penetration and higher usage
      - ○ Attractive services
    - ■ High capacity BRAS vs. distributed BASes
  - ◆ Turbo button for QoS on-demand:
    - ■ Need for agreed implementation concept
    - ■ Modify the link all the way from CPE to ISP
  - ◆ Improved authentication:
    - ■ Over metro Ethernet and mobile environment (e.g. Wi-Fi)
  - ◆ Co-exist with non-web-based services
    - ■ DHCP with virtual routing vs. PPP method

-Integrated BRAS
-Split BRAS Functionality

-Northbound Control Protocol
-Full Access Cluster Control

-Improved PPPoE
-SIM based authentication

-DSLAM as DHCP relay

Conversational Service Category

Peer-to-peer Multimedia

Peer-to-Peer Service
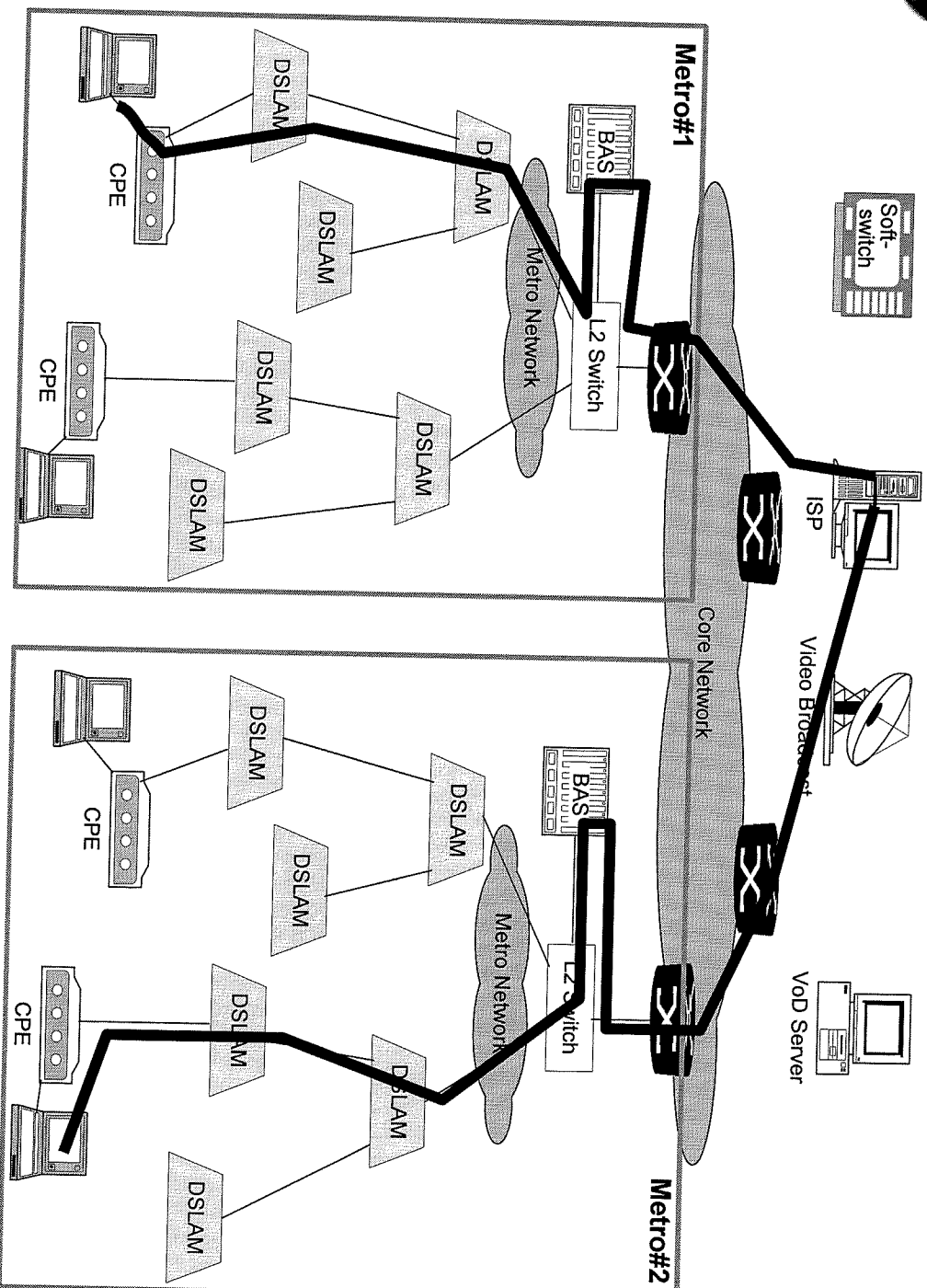
- **Operator reports that 40-80% of BB bandwidth is utilized by the current best effort peer-to-peer service**

- **The peer-to-peer mechanism serves:**
  - ◆ **Advanced** *Telephony* **system** *over the* **BB network**
  - ◆ *PC-to-PC* **for end-to-end** *multimedia* **session**
  - ◆ *PC-to-Server/Application* **platform**
  - ◆ **Any** *machine to machine* **inter-connection**

Current Peer-to-Peer Support

Current IM and image transfer application:

- **Routing at ISP domain**
- **QoS is best effort**

  - **BRAS controls subscriber's access:**

    - IP addresses and Authentication

Metro#1

Metro#2

DSLAM

CPE

BAS

Metro Network

L2 Switch

Core Network
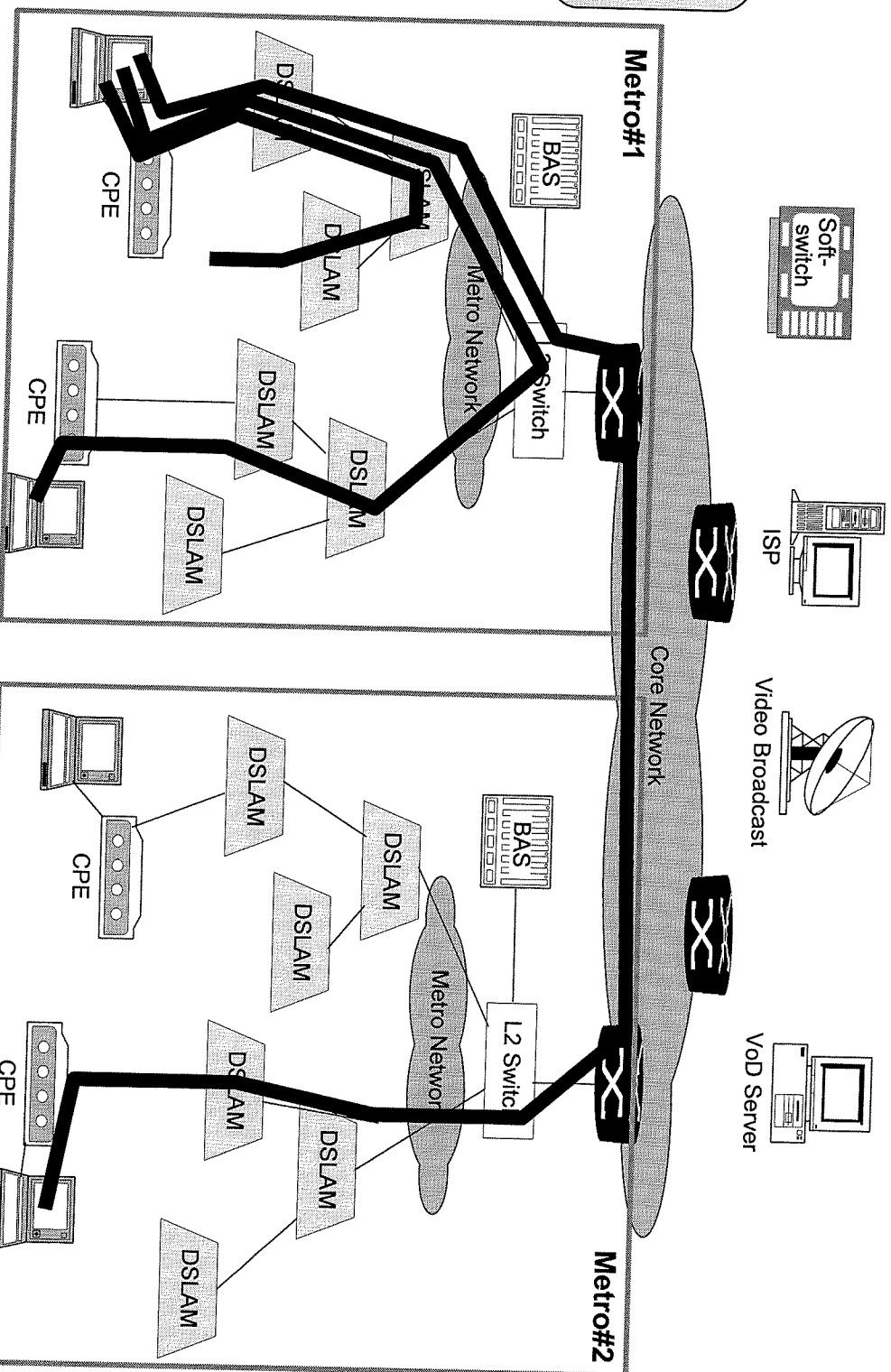
Soft-switch

ISP

Video Broadcast

VoD Server

Efficient Peer-to-Peer support

Position of the Network edge device

?

- Co-exist with web based services

Benefits

- Media delivery on shortest path
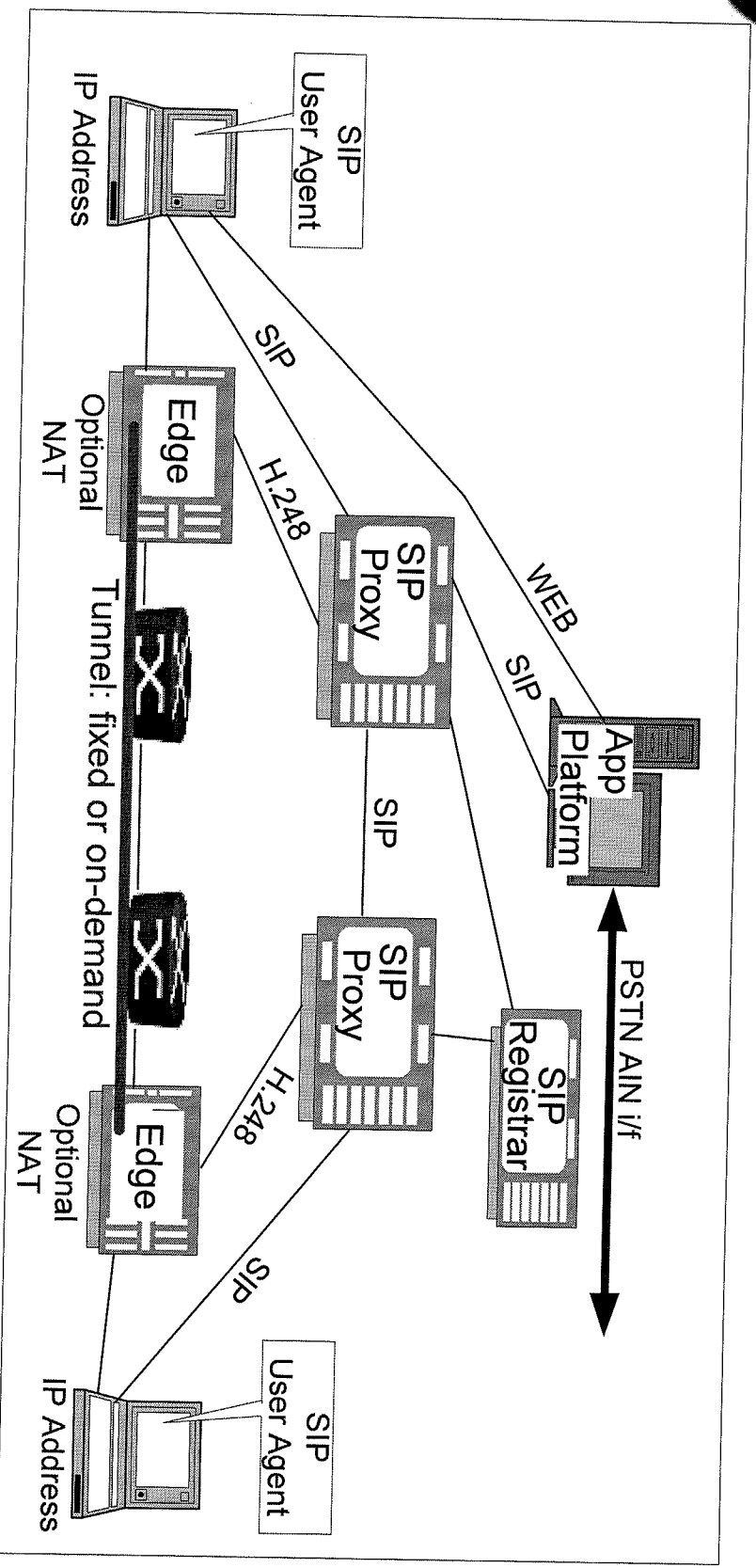 - ◆ Improves efficiency and scalability
- QoS is managed per session

Threats

- Opens options for *pirate* sessions (un-paid)
 - ◆ Connectivity under billing → per session control

Metro#1

BAS

Soft-switch

ISP

Video Broadcast

VoD Server

Metro Network

L2 Switch

CPE

DSLAM

Core Network

Metro#2

CPE

DSLAM

BAS

Metro Network

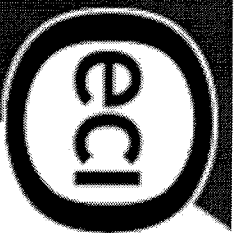L2 Switch

On-Demand Session

- **Edge device with per flow/session awareness**
- **Signalling protocols for connectivity on-demand: SIP, MPLS/RSVP & H.248**
- **IPv6 vs. IPv4 with NAT**
- **Billing: SIP server(s) for session level, edge-device for traffic counters**
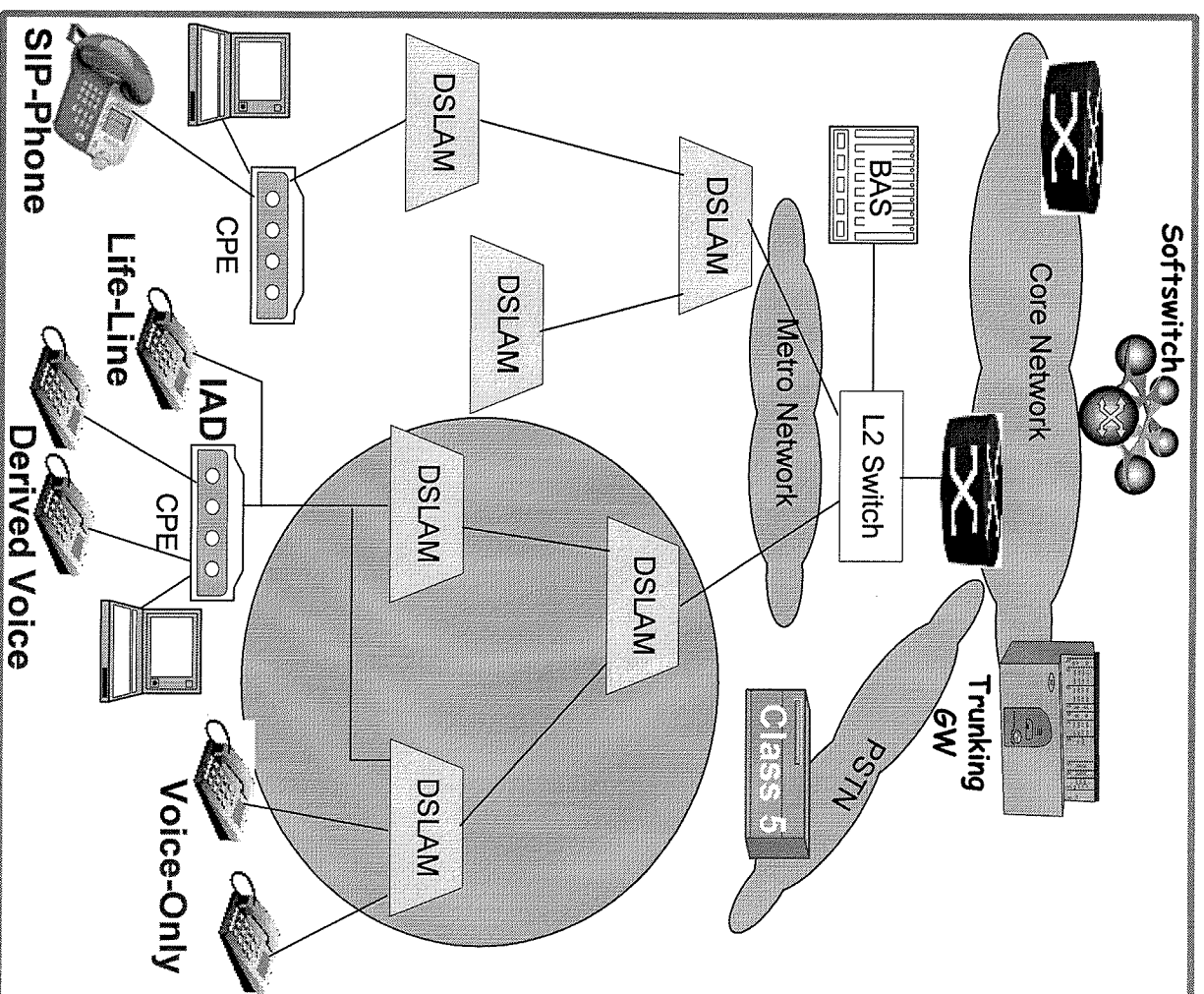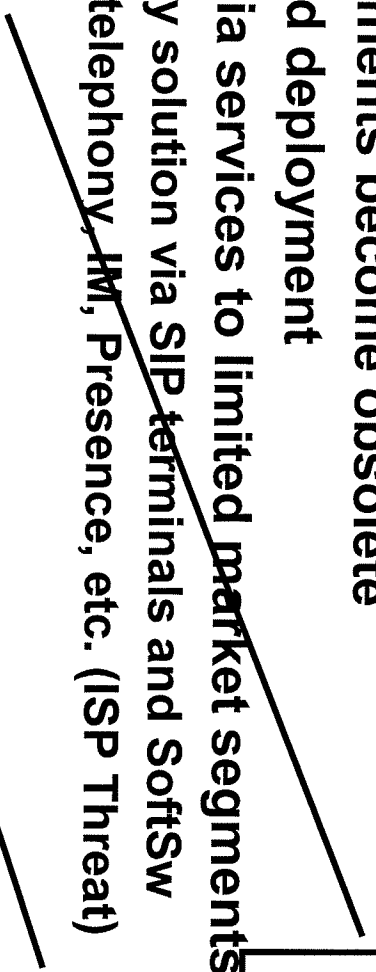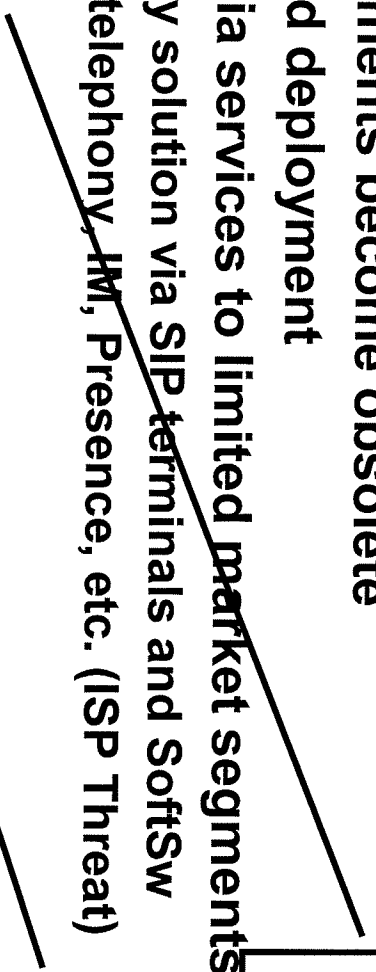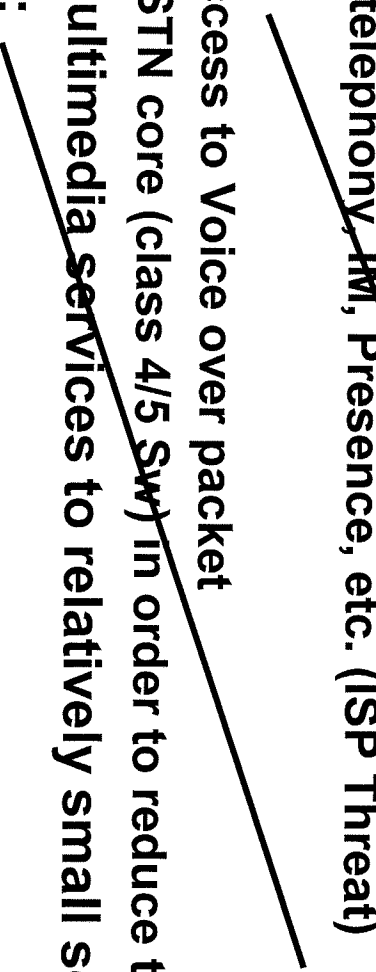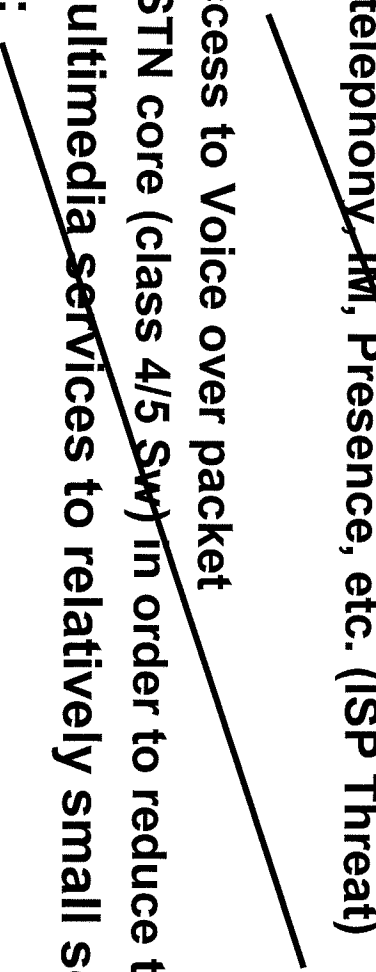- **Security: IPSec tunnels**
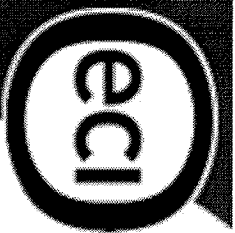
Voice at the Access

BLES and MBN Models

Voice Convergence at the Access
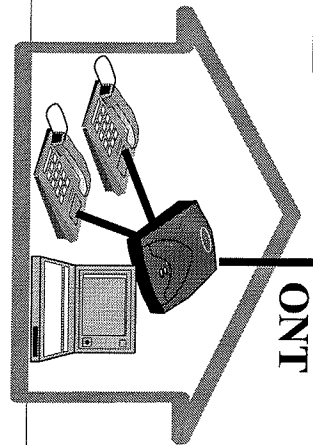
Penetration of NG Voice Solution

- **Massive replacement of PSTN: expected beyond 2010**

- **Integration of NG Voice solution in the near future is expected when:**

  - ◆ PSTN elements become obsolete
  - ◆ Greenfield deployment
  - ◆ Multimedia services to limited market segments
    - Overlay solution via SIP terminals and SoftSw
    - Video-telephony, IM, Presence, etc. (ISP Threat)

- **First Step:**

  - ◆ Migrate access to Voice over packet
  - ◆ Rely on PSTN core (class 4/5 Sw) in order to reduce the risk
  - ◆ Provide multimedia services to relatively small segment

  - **Further Step:**
    - ◆ Replace the PSTN core with VoIP SwSw
    - ◆ Mass penetration of SIP phones
    - ◆ Mass penetration of SIP phones
      - 3G UMTS terminals with DECT interface

VoATM per BLES model

VoIP per MBN model

Integrated Voice Solution

Main Building Blocks

ecl

- IVD, POTS, ISDN, IAD
- Full Redundancy

PSTN

Class 5 SW

Trunking GW

- Deep Compression
- Sig Conversion
- Re-encapsulation

Border GW
Proxy Sig
- Single IP Addr &
L5 NAT

V5.x/GR303/TR08

CES

RTP/RTCP

VoATM (PWE3)

SIP/RTP

H.248/IUA
SIP Proxy

Softswitch

H.248/RTP

ATM

IAD

SIP Phone

Voice Only

ONU

ONT

xDSL+POTS

[1:N]

Master

Video Solution

H.610 Based

Video Distribution

Zapping (IGMP)

EPG, Session Control, Encryption Key

RTSP

Video Streams

Internet(PPPoE)

Internet(PPPoE)

Middleware(DHCP)

IGMP

Video

Cascading

oDSrvr

Middleware

ATM

IP

Router

HeadEnd

ISP

STB

STB

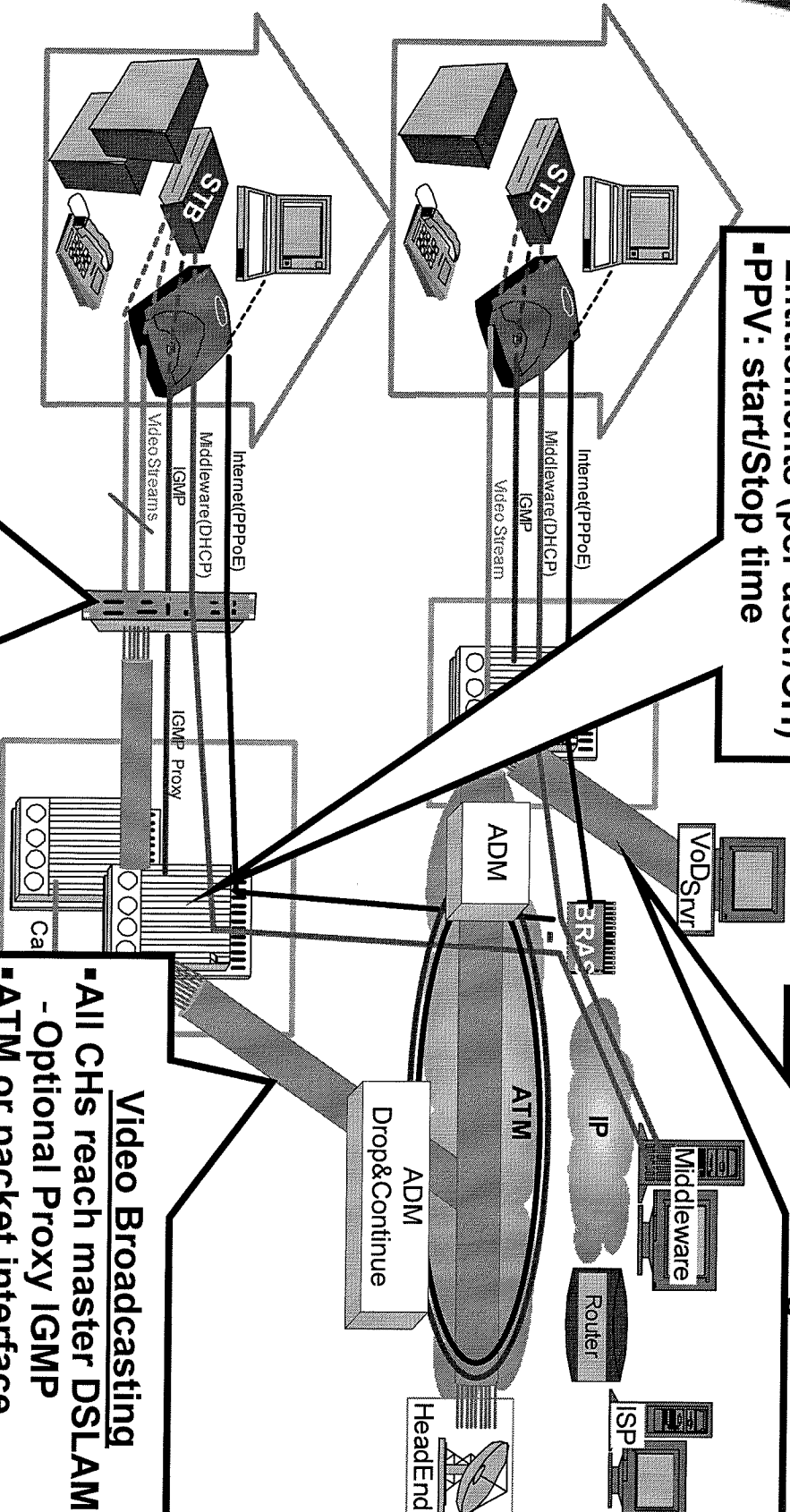# Video Distribution
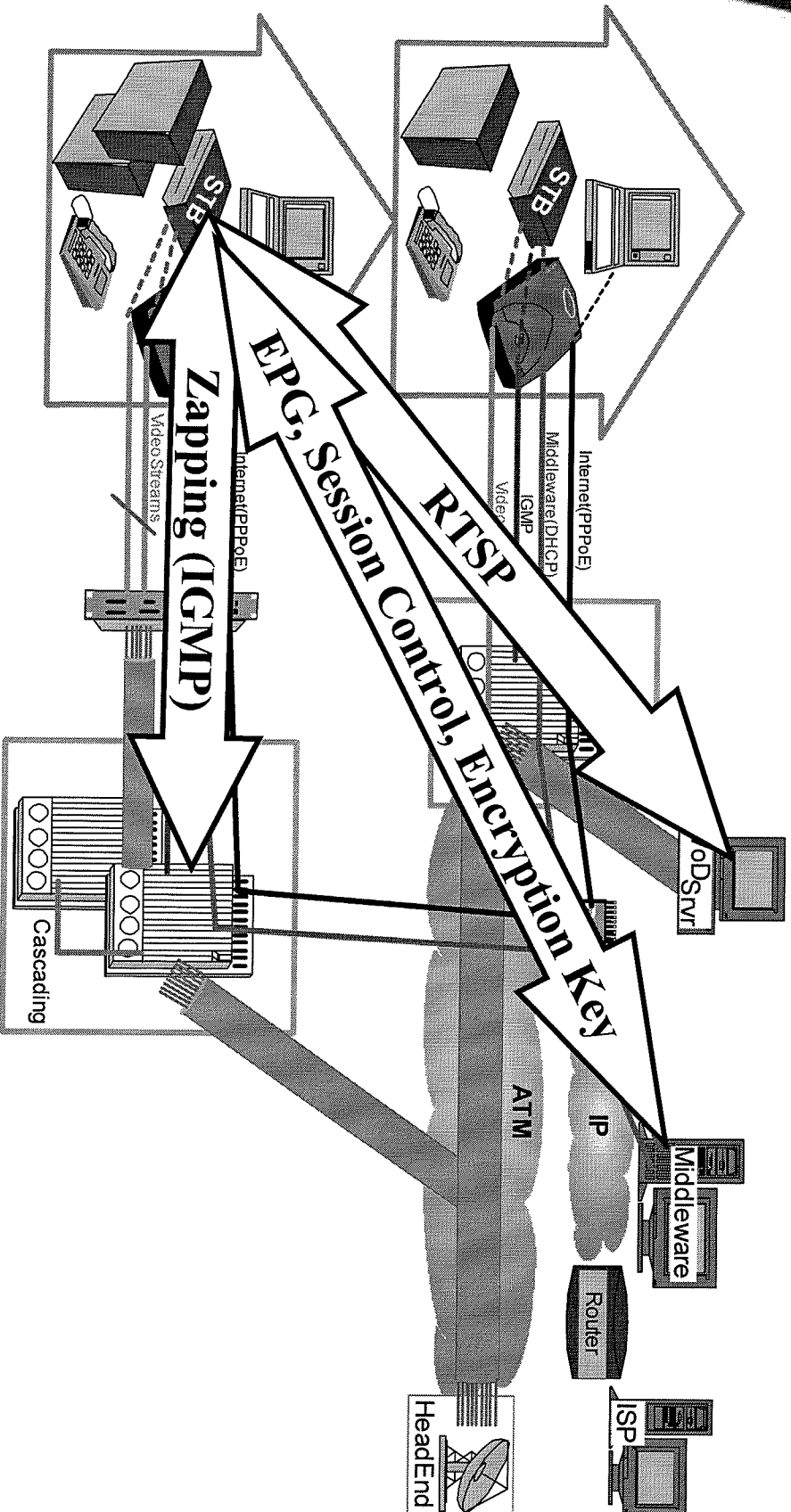
ACT:Access Ctrl Tab
- Entitlements (per user/CH)
- PPV: start/Stop time

VoD
- Distributed vs. Centralized
- Dynamic BW allocation
- BW overbooking control

Broadcasting
- Multi-level multicast
- Multi-level Zapping nodes
- IGMP keep-alive and recovery
- Zapping Regression
- Fast Channel Provision

Video Broadcasting
- All CHs reach master DSLAM
  - Optional Proxy IGMP
- ATM or packet interface
  - IP/Ethr or IP/1483
- SNMP CH table:
  - MPEG2: 4Mbps, MPEG4: 1.5Mbps
- Save BRAS BW
  - Independent layer 1 overlay
  - DSLAM combine UC&MC
  - Multiple CH Interfaces

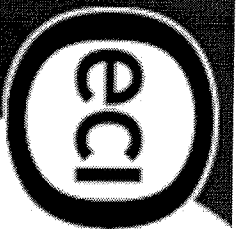Labels: STB, Video Streams, IGMP, Middleware(DHCP), Internet(PPPoE), IGMP Proxy, ADM, VoDSrvr, BRAS, ATM, ADM Drop&Continue, IP, Middleware, Router, ISP, HeadEnd

ECI Proprietary and Confidential

Mobility and Personalization

Mobility and Personalization

- Mobility and personalization reflect the need to be always-on and get the BB service

- Wireless technology is the enabler:
  - ◆ Wi-Fi for short ranges (private or public domains)
  - ◆ DECT and Bluetooth at home/office
  - ◆ But, fixed line services also ask for mobility

- Mobility:
  - ◆ The ability to get any-service by any-terminal anytime and anywhere
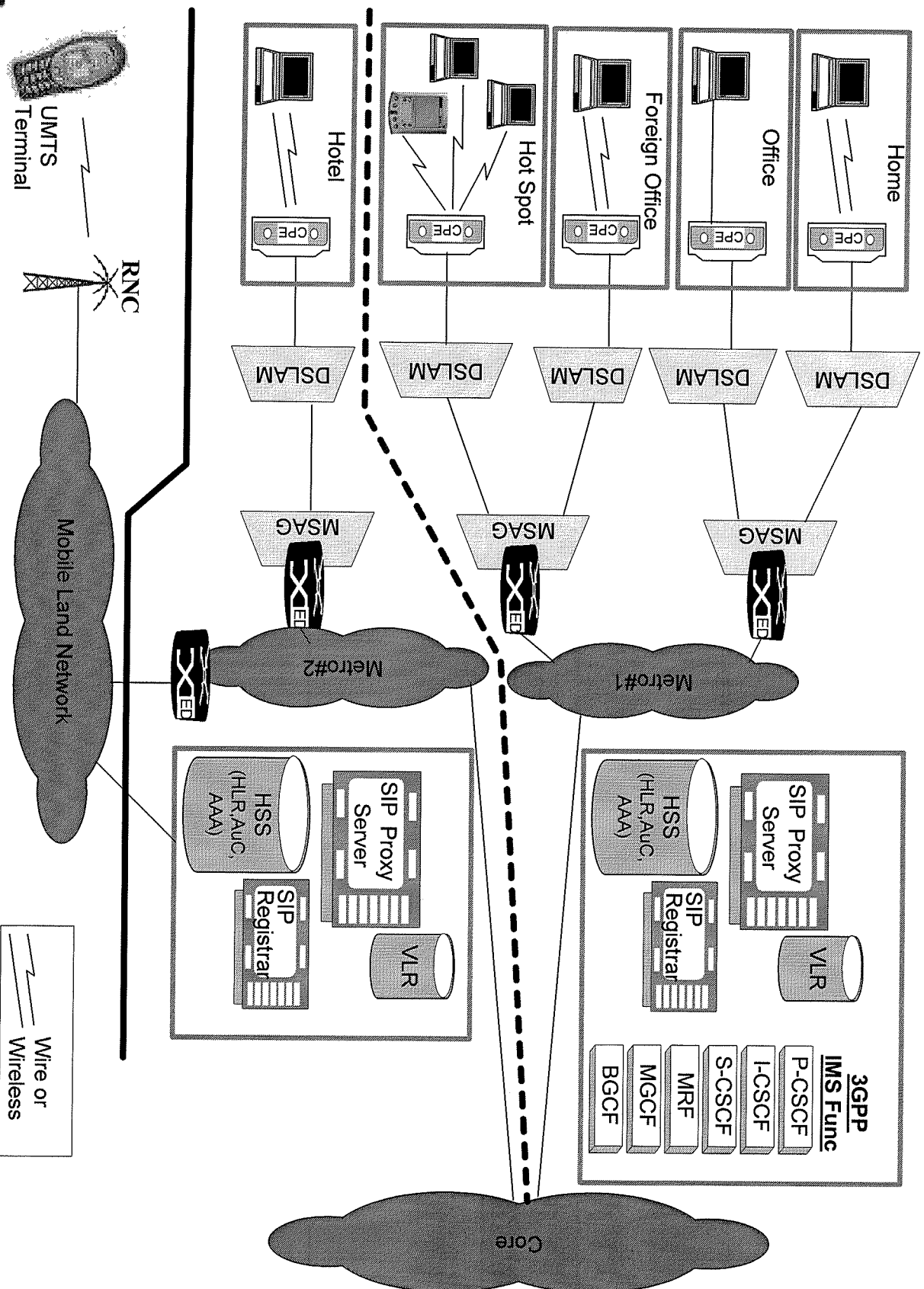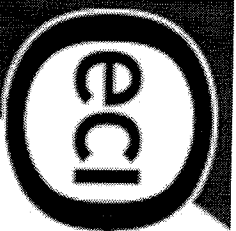 - ◆ Nomadic services vs. mobile services

- Personalization:
  - ◆ The ability to recognize/authenticate an end-user wherever he is and however he is logged in (home or foreign network)
  - ◆ Retrieve his service profile from his home-network
  - ◆ Be able to provide appropriate customized-service, adapted to the access media being used
  - ◆ Bill the user accordingly at his home-network

Mobility for Nomadic Services

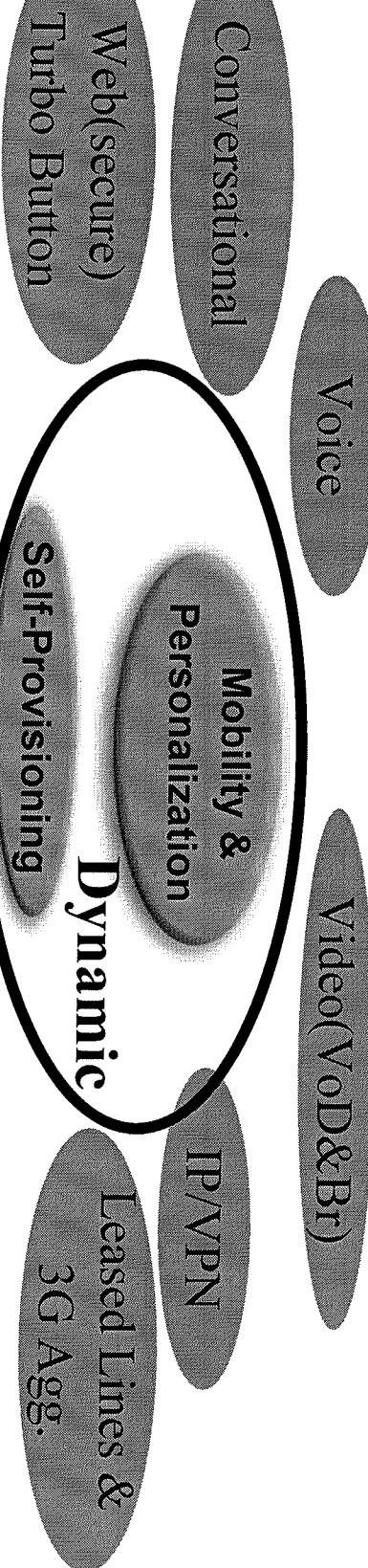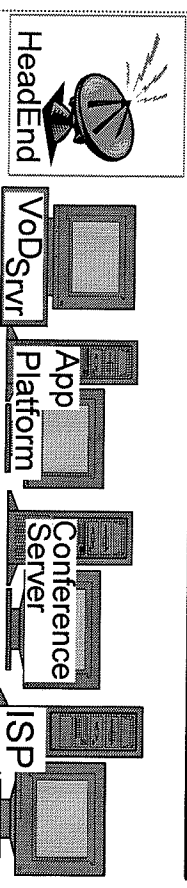## Built-In Multimedia Conversational Services

Hotel

Hot Spot

Foreign Office

Office

Home

DSLAM

MSAG

Metro#2

Metro#1

HSS (HLR,AuC, AAA)

SIP Proxy Server

SIP Registrar

VLR

3GPP IMS Func

P-CSCF
I-CSCF
S-CSCF
MRF
MGCF
BGCF

UMTS Terminal

RNC

Mobile Land Network

Core

Wire or Wireless

CPE

Wireline NGN Core Network

- Wireline operators seriously consider to build their core network base on the 3GPP-R5 IMS model:

  ◆ Conversational sessions, Mobility and advanced services

- The 3GPP-R5 IMS model:

  ◆ 'Access' and 'Core' as independent network domains

  ◆ Built-in roaming and handoff procedures

  ◆ "All IP" and SIP protocol:

    ■ Call State Control Function (CSCF) entity

    ■ SIP Addressing, SIP Registration, INVITE, etc

  ◆ Security

    ■ Traffic encryption via coordinated random keys

    ■ Protect users against terminal stealing(SIM/USIM/EIR method)

  ◆ Personalization and authentication based on SIM/USIM method and HLR database

- Hot-Spot access via DSLAM's symmetrical interface:

  ◆ Registration 'pipe' and process, Personalization, On-demand sessions,...

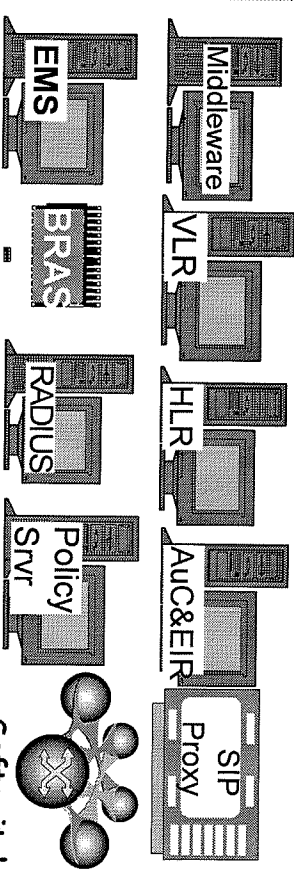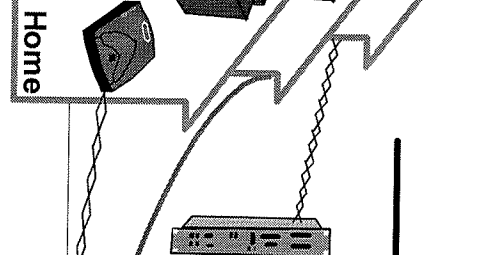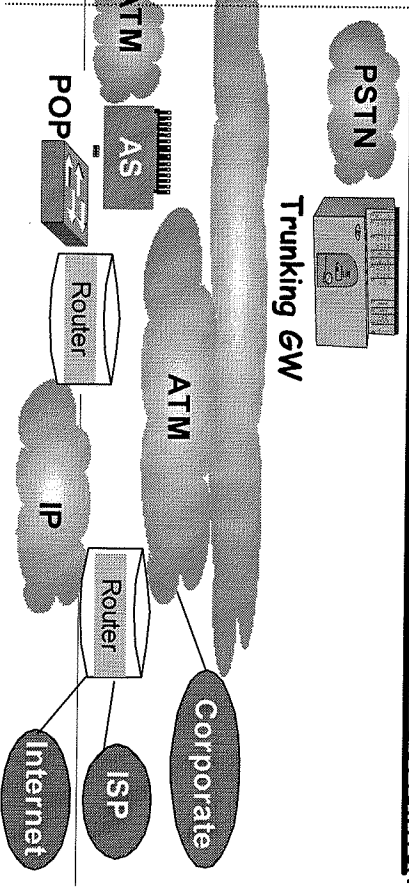# Service Elements Summary

Application Plane

- Conversational
- Web(secure) Turbo Button
- Voice
- Mobility & Personalization
- Self-Provisioning
- Dynamic
- Video(VoD&Br)
- IP/VPN
- Leased Lines & 3G Agg.

Control Plane

- HeadEnd
- Middleware
- VLR
- HLR
- AuC&EIR
- EMS
- BRAS
- RADIUS
- Policy Srvr
- VoDSrvr
- App Platform
- Conference Server
- SIP Proxy
- ISP

Media Plane

- CO
- DSLAM Aggreg.
- ATM
- POP
- PSTN
- AS
- Trunking GW
- ATM
- IP
- Router
- Router
- Corporate
- Internet
- ISP
- Softswitch

Home

eci

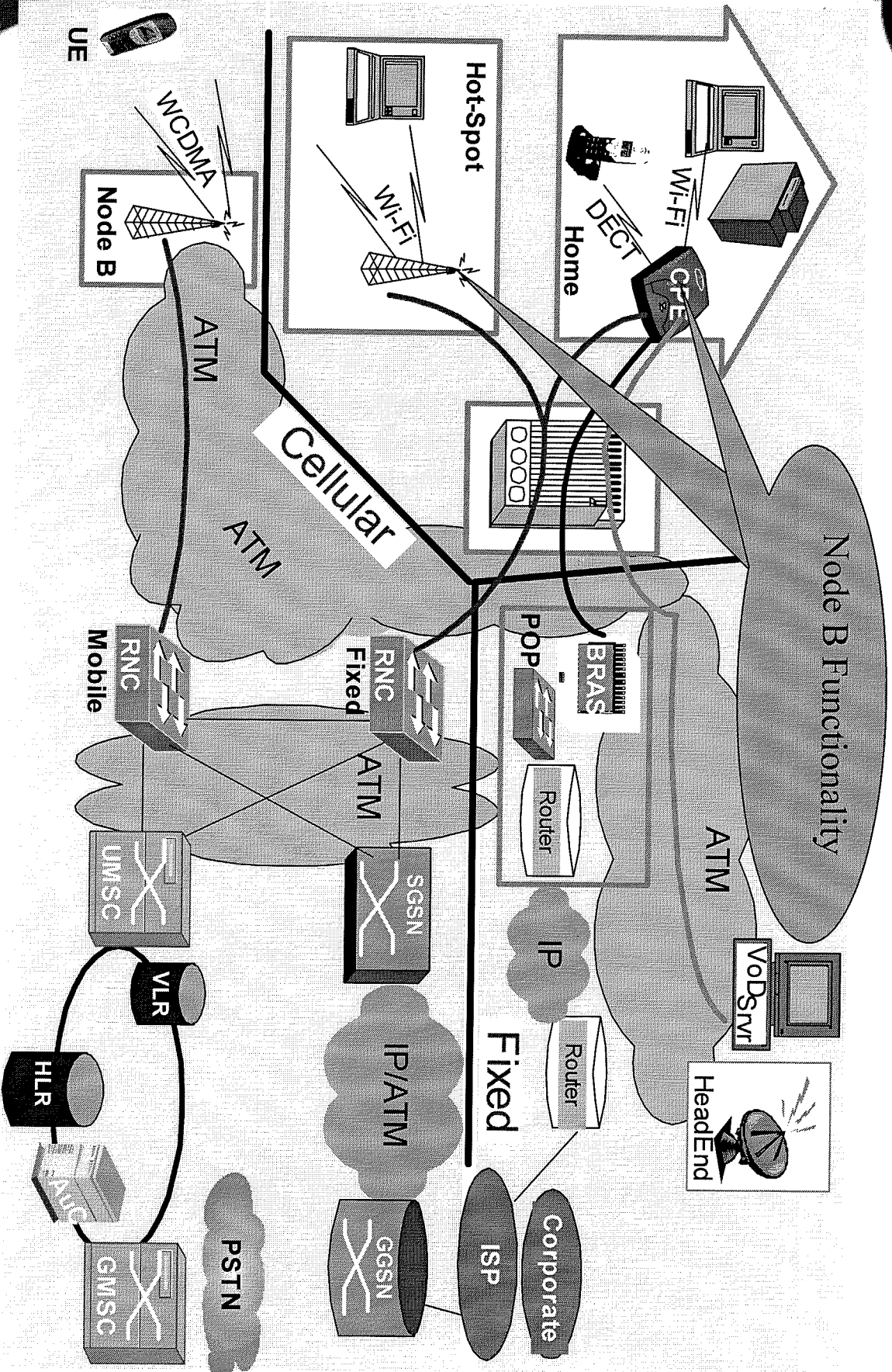# Cross Network Subscribers

Cross Network Subscriber

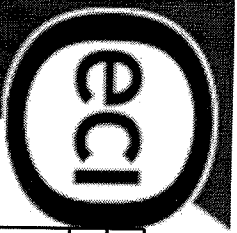## Via Centralized Class5 Switch, no Mobility
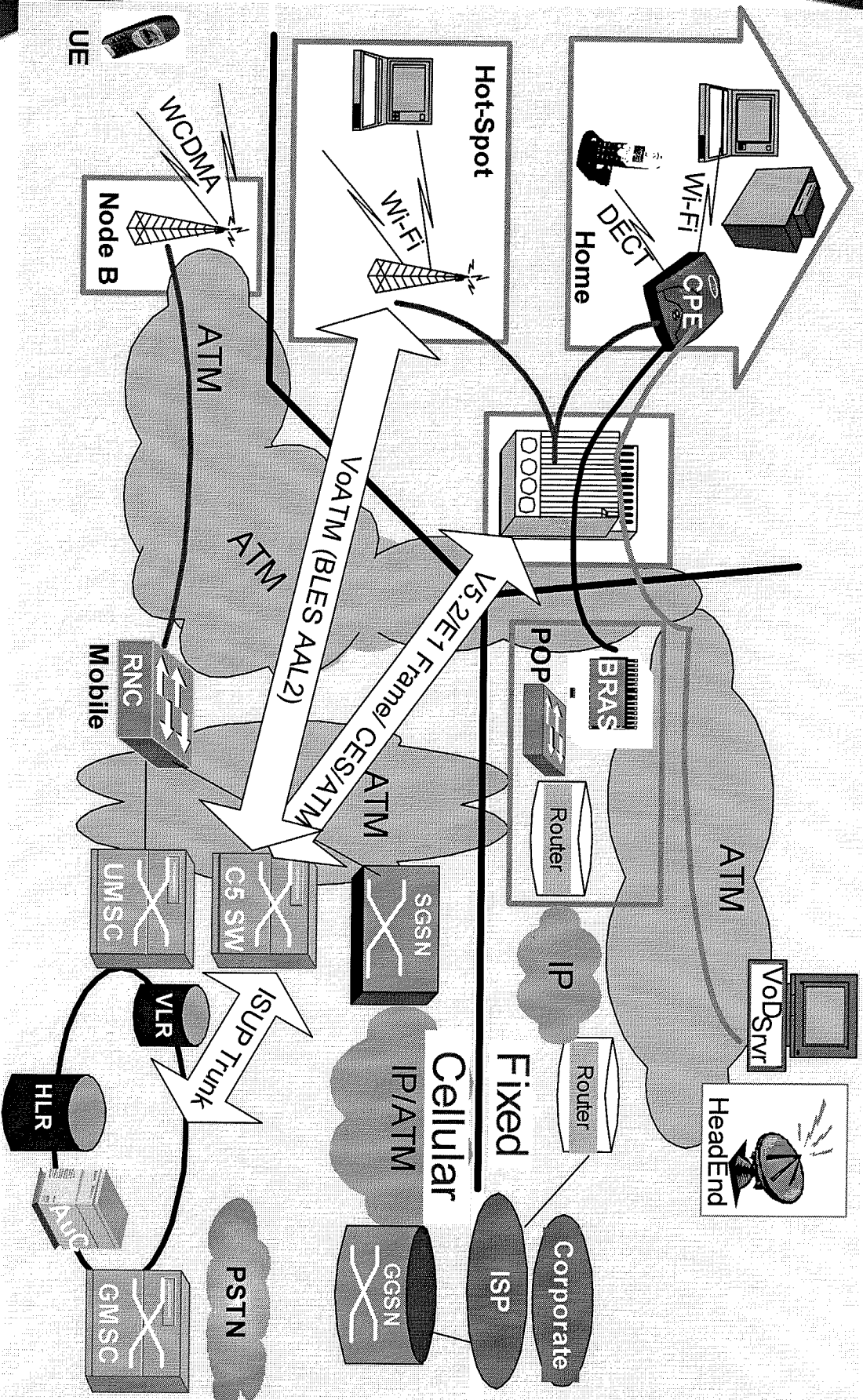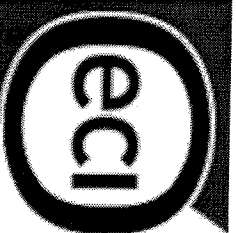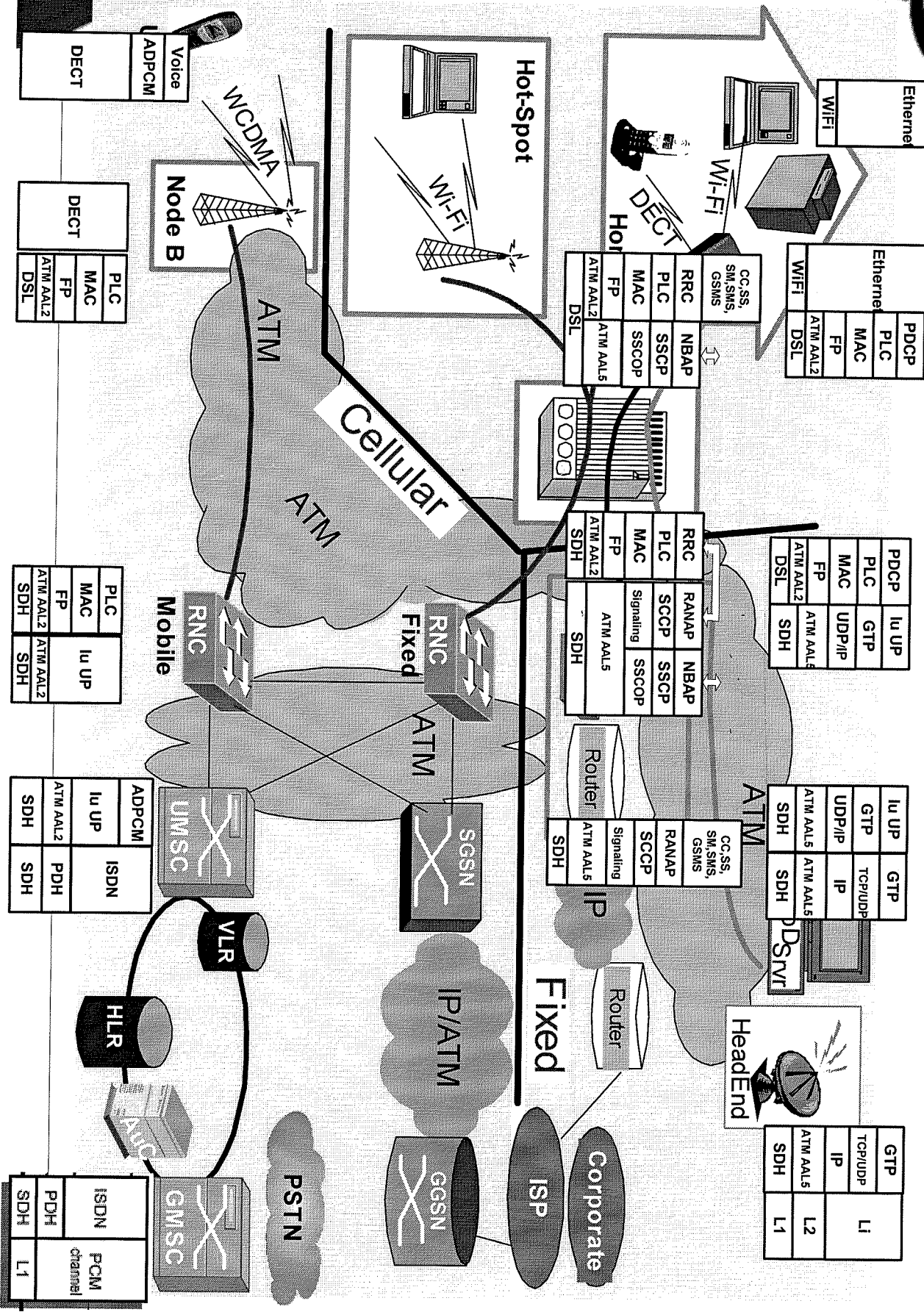
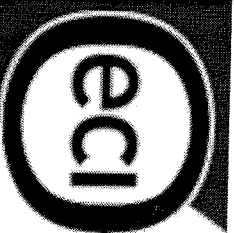# Cross Network Subscriber
Via RNC to R99 Core, with Mobility

Cross Network Subscriber
## Via RNC to R99 Core, with Mobility

ecl

CLEC's Operation Model
ISP Model

- Hire ATM VCs, with QoS from CPE to CLEC Center

- Optionally own the CPE

  ◆ Traffic classification (L1-L5), routing and QoS can be remotely control

  ◆ Dynamic resource allocation: Controlling the two ends of an ATM connection as an alternative to lack of standard protocol between deployed DSLAMs and control plane

  ◆ Enable to provide voice services over packet (life line?)

- Service Options:

  ◆ Own the customer and provide all services or

  ◆ Provide mobile services only:
    - Circuit Switch Voice/SMS services
    - Packet Switch GPRS services (Hot-Spot subscriber)

- DSL management is done by ILEC

  ◆ Optional use of ATM OAM for failure location
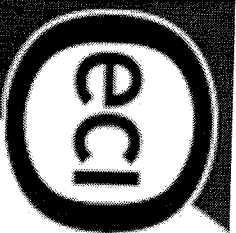
CLEC's Operation Model
Unbundling Model

- Hire copper and use CLEC owned infrastructure
  - DSLAMs, CPEs, DSLAM aggregators and management system:
  - Distributed DSLAMs of any required size
  - Master DSLAM is located at CLEC center with MSAG capabilities

- Voice life line becomes possible
  - Connect the life line to a class 5 switch or directly to the mobile system

- Manage and monitor the DSL rate, the QoS, PM and other resources end-to-end

- Integrate control plane agent in a DSLAM for dynamic resource allocation:
  - E.g. emulate the PDP protocol used in GPRS to establish a session
  - Standardization is needed

- Service Options:
  - Provide mobile services and all types of fixed network services (e.g. DVD quality video service
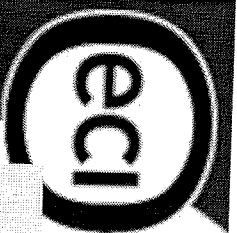
Cross Network Subscriber
Via CSCF to R5/6 Core, with Mobility
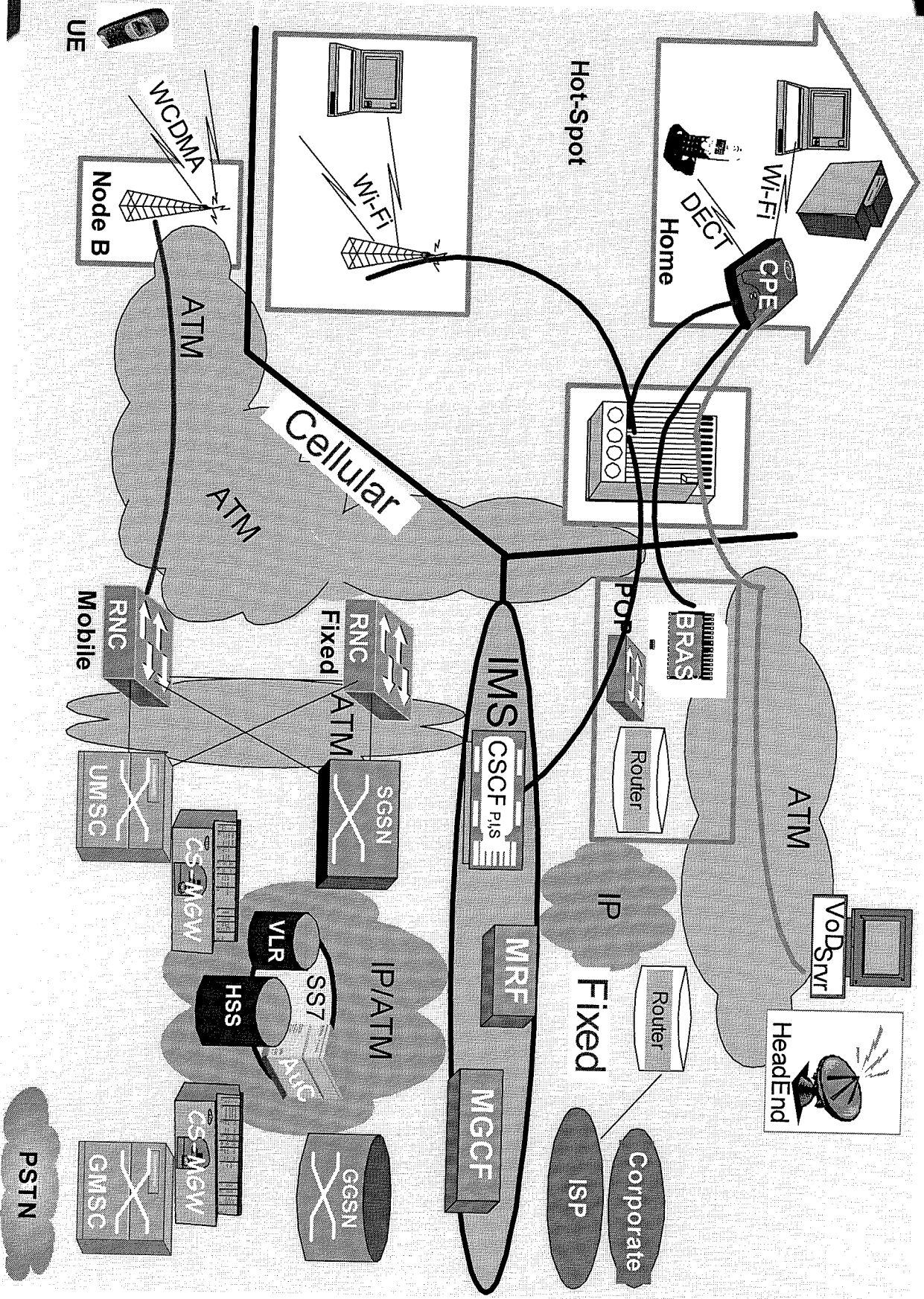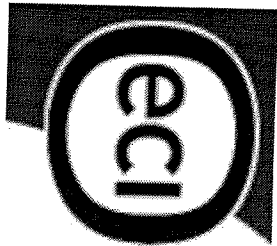
Coming Soon to a Living Room Near You

THANK YOU !

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